Wisconsin's Mathematical Financial Literacy for Adults: Does it Exist and is There a Need?

By

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Abstract

Financial literacy has been a hot topic in recent years. Wisconsin's Governor Jim Doyle implemented a council on this topic in 2005 in the efforts to help its citizens. Through this council, Wisconsin has helped support and implement many programs for kids and adults. However, people have testified before the United States government that a roadblock of financial literacy is poor math skills, yet these two topics are not taught together. Can a financial literacy program be truly successful without basic math skills? It is easier to reach those currently in high school and grade school, but what about the adults who are no longer in school and do not have the basic math skills needed to understand basic financial literacy topics? The purpose of this study is to see if teaching math with financial literacy to adults has a noticeable impact on their understanding of the topics presented. Six financial topics were presented with the mathematical skills needed to compute and understand them over a three week seminar. These topics include: multiplying decimals, percentages, budgeting, simple interest, compound interest, mortgages, credit cards, and retirement. The subjects were from the St. Croix Valley Jobs Center in River Falls, Wisconsin. After analyzing the data, there were noticeable improvements from the subject's first week pretests to their third week posttests. This study also led to more questions: Do some people not seek help in financial literacy due to a fear of mathematics? Is Wisconsin's financial literacy program all that it says it is? This study concludes that mathematics and financial literacy should be taught jointly for optimal success.

Introduction and Literature Review

This paper will examine the Wisconsin Financial Literacy Program and try to discover if mathematics plays a role in the program and if not, should it? One of the main causes of the financial meltdown in America is financial illiteracy. Many Americans signed loan agreements they did not understand and should not have made (Department of Financial Institutions for the State of Wisconsin, 2011). In order to prevent future economic catastrophes, the public needs enough financial education to enable them to make sound financial decisions. The majority of Americans do not have "rainy day" funds set aside for unanticipated financial emergencies and similarly do not plan for predictable life events such as their children's college education or their own retirement (FINRA, 2009). The National Center for Education Statistics reports that in 2007-2008 over half of dependent undergraduates have at least one credit card with the average monthly balance of $2200 and 40.5% of undergraduates have a balance due (Staklis, 2010).

The Wisconsin Department of Public Instruction developed financial literacy educational standards in 2005 and has been slowly encouraging schools to adopt them into their already packed curriculum (Wisconsin Department of Public Instruction, 2010). Since it appears to be a battle to mandate a full financial literacy course (Saemann, 2010), at least the state has started taking baby steps in that direction. In 2011, the state encouraged all schools to participate in Money Smart Week. The Department of Public Instruction planned a session for educators on "Get Your Students Pumped Up on Personal Finance and Economics!". The Department also gave educators the guide "Planning Curriculum in Personal Financial Literacy" to help schools incorporate the standards across their curricula year round. Wisconsin is on the right track to help our young people understand the basics of financial literacy, but what about the adults that already graduated that did not have the opportunity to learn any of this? The Wisconsin Governor's Council on Financial Literacy (GCFL) was charged to "measurably improve the

financial literacy of Wisconsin's citizens" (Doyle, 2005). To that end, the council created five committees of focus: Formal Education in Schools, Employee Education Programs, Emerging Market Opportunities, Prevention of Fraud Programs, and Family Financial Literacy Programs. Wisconsin participates in Money Smart Week; during this week in April consumers can participate in different seminars throughout the state on financial literacy. As a state, Wisconsin has taken steps to improve the financial literacy of its citizens (Department of Financial Institutions for the State of Wisconsin, 2011). Through K-12 programs, Money Smart Week, and through workplace financial education programs, Wisconsin has taken the initiative to educate its citizens in financial literacy. Wisconsin has also teamed up with many banks to help spread financial education to more of the public. However, the issue of low mathematical skills and financial literacy has yet to be addressed. In 2006, Chairman of the Federal Reserve Ben S. Bernanke submitted his testimony on Financial Literacy before the Committee on Banking, Housing, and Urban Affairs of the United States Senate. He testified that "in some cases, financial education efforts are constrained by gaps in math and reading literacy, which impede comprehension of fundamental financial concepts" (Bernanke, 2006). Two years later, in 2008, the Director of the Division of Consumer and Community Affairs, Sandra F. Braunstein, testified on Financial Literacy findings before the Committee on Financial Services in the U.S. House of Representatives. She noted that "Financial education efforts may also be constrained by gaps in math and reading literacy, which impede comprehension of fundamental financial concepts" (Braunstein, 2008). Two years apart and still the same concerns are present about mathematics and financial education. In 2009, Rick Ketchem presented the results of the National Financial Capability Study to the United States Treasury and noted that "far too many (Americans) tend to engage in financial behaviors that generate excessive expenses and fees. And all too few are able

to calculate basic interest and other math-oriented tasks" (Ketchum, 2009). In looking at the Wisconsin Financial Literacy Report from January, 2011, mathematics is only mentioned once in regards to a middle school math lesson. If the Chairman of the Federal Reserve and the Director of the Division of Consumer and Community Affairs both testify that one of the roadblocks of financial literacy education is low math literacy, then why isn't there a push to educate the public on both of these important topics together? I could not find studies done in the past that addressed these two issues together and I believe that they should go hand in hand - that you cannot be educated in financial literacy without having a mathematical understanding of where the numbers come from.

Purpose

In the hopes of educating some of the public in mathematical financial literacy, I taught a free three week seminar on mathematical financial literacy at the St. Croix Valley Jobs Center in River Falls, Wisconsin. It covered multiplying decimals, percentages, simple interest, compound interest, mortgages, credit cards, retirement, and budgeting. The purpose of my research was to see if there is a need for a mathematical financial literacy seminar open to the general public. The research determined whether a group of River Falls, Wisconsin citizens possessed the knowledge to make educated financial decisions and if taking this week long mathematical financial literacy seminar would improve their knowledge. If we were to try to increase people's basic knowledge in personal finances, we would require some brush-up on the basic mathematical skills needed to fully understand the financial topics. I could not find any effort to infuse mathematics into financial literacy education being taught to adults anywhere. It seems that these two topics are covered separately. Financial Literacy is being taught by various

methods throughout the state, but if you want a basic mathematics course you need to pay for one at your local college or Community Education Program. The goal of this research was to determine whether the adults in my seminar would benefit from some basic mathematical education in order to help them fully understand some basic personal finance topics.

Design

The St. Croix Valley Jobs Center agreed to have me present a "Money Math" seminar at their facility. The St. Croix Jobs Center helps out of work citizens find jobs and prepare for the workforce. We agreed that they would advertise this seminar in their weekly flyer that goes out to the general public in the area. However, since only two individuals signed up for the free seminar, we decided that I would present the seminar to a group that regularly meets every week through Workforce Connections (a branch of the St. Croix Valley Jobs Center) and include the two that had signed up previously into this group. This group consistently draws about 12-14 people who participate in the Wisconsin Works Program (W-2), which is an employment based assistance program for low income families with dependent children. A mathematical financial literacy pretest was given to the group on their first day and they were informed that their participation in the study was voluntary (Appendix A). All of the participants were adults and each one was given a number by the Job Center that would be used on the pre- and posttests instead of their names. The absence of names from the test ensured anonymity. I presented lessons on multiplying decimals, percentages, budgeting, simple interest, compound interest, mortgages, credit cards, and retirement in that order (Appendix B). Additional practice problems/homework was given and the answers to these problems left at the Job Center for them to check their work (Appendix C). After all the lessons had been covered and reviewed (see

Appendix D), the participants took a posttest (same questions as the pretest). This posttest included a question on how useful they felt the seminar was to them, space to rank the topics on how important they were to them, and a general comments section (Appendix E). Lastly, the quantitative data of those participating were analyzed to see if the posttest scores were significantly higher after participating in the seminar or if the results were not significant.

Results

At the start of the seminar, I had 10 participants for the study. Some of these participants found jobs or where unable to attend the last class for other reasons, therefore, I only had 5 participants take the posttest on the last day. Table 1 shows the pretest scores, posttest scores, and the difference of the two.

Table 1

Number	Pretest	Posttest	Difference
1	100	86	-14
2	41	86	45
3	82		
4	69	98	29
5	67		
6	51		
7	88	96	8
10	45		
11	27	57	30
13	33		

After I eliminated the five that did not finish the seminar, the new data looks like this:

Table 2

Number	Pretest	Posttest	Difference
1	100	86	-14
2	41	86	45
4	69	98	29
7	88	96	8
11	27	57	30

Four of the five who completed the seminar did noticeably better, and one participant score decreased. The average and median test scores of the data in Table 2 are in Table 3:

Table 3

	Pretest	Posttest	Difference
Average	65	84.6	+19.6
Median	69	86	+17

Table 3 shows a 19.6% average increase between the first pretest taken and the identical posttest given with an average increase of 17% for the median. This shows how the financial math skills improved throughout the seminar and overall this is a very positive outcome. There are some negative outcomes to consider however. There was one student whose grade decreased from the pretest to the posttest and the lack of participant numbers makes it difficult to draw statistically significant conclusions, however, the available data certainly supports a need for mathematical financial literacy education.

Since only five students finished the seminar, it is easier to show how each student did on each of the topics covered on the pre- and posttests. Tables 4 and 5 show the student scores by topic and includes the averages for each topic. Table 6 displays the percent change that the students had overall on each topic.

Table 4. Pretest Percentages by Topic

Topic	Student 1	Student 2	Student 4	Student 7	Student 11	Average
Multiplying Decimals	100	40	100	80	100	84
Percentages	100	0	50	90	50	58
Budgeting	100	100	100	100	50	90
Simple Interest	100	60	80	100	0	68
Compound Interest	100	10	50	100	0	52
Credit Cards	100	50	50	50	0	50

Table 5. Posttest Percentages by Topic

Topic	Student 1	Student 2	Student 4	Student 7	Student 11	Average
Multiplying Decimals	100	80	100	100	80	92
Percentages	50	50	100	80	50	66
Budgeting	100	100	100	100	50	90
Simple Interest	100	100	100	100	50	90
Compound Interest	80	90	90	100	70	86
Credit Cards	100	100	100	100	50	90

Table 6. Percent Increase Between Pretest and Posttest

Topic	Increase
Multiplying Decimals	8
Percentages	8
Budgeting	0
Simple Interest	22
Compound Interest	34
Credit Cards	40

As shown from Table 6, the topics of greatest improvement came from the simple interest, compound interest, and credit cards, while the budgeting showed no improvement.

On the back of the posttest, I asked the participants to rate how useful this seminar was to them with 1 being not very useful and 5 being very useful. Of the four that completed this section, 3 responded with a 5, meaning very useful, and one participant responded with a 4. I also asked the participants to rank the topics discussed in the order of importance to them, with one being the most important and 7 being the least important. The Table 7 shows the results of the topics rankings.

Table 7

Topic	Student 1	Student 2	Student 4	Student 7	Average
Retirement	2	1	4	2	2.25
Mortgages	3	2	2	6	3.25
Credit Cards	6	7	3	1	4.25
Compound Interest	7	6	1	3	4.25
Percentages	1	4	7	5	4.25
Budgeting	5	3	6	4	4.5
Simple Interest	4	5	5	7	5.25

As a whole, they felt that simple interest was the least important and retirement was the most important. Another way to analyze the data is to look at each students pretest and posttest by topic and add how important they felt each topic was to them (1 is most important and 5 is least important). Since Student 11 did not complete his/her rankings, they were not included in the breakdown.

Table 8. Student 1 Results

Topic	Pretest	Posttest	Ranking
Multiplying Decimals	100	100	n/a
Percentages	100	50	1
Budgeting	100	100	3
Simple Interest	100	100	2
Compound Interest	100	80	5
Credit Cards	100	100	4

Table 9. Student 2 Results

Topic	Pretest	Posttest	Ranking
Multiplying Decimals	40	80	n/a
Percentages	0	50	2
Budgeting	100	100	1
Simple Interest	60	100	3
Compound Interest	10	90	4
Credit Cards	50	100	5

Table 10. Student 4 Results

Topic	Pretest	Posttest	Ranking
Multiplying Decimals	100	100	n/a
Percentages	50	100	5
Budgeting	100	100	4
Simple Interest	80	100	3
Compound Interest	50	90	1
Credit Cards	50	100	2

Table 11. Student 7 Results

Topic	Pretest	Posttest	Ranking
Multiplying Decimals	80	100	n/a
Percentages	90	80	4
Budgeting	100	100	3
Simple Interest	100	100	5
Compound Interest	100	100	2
Credit Cards	50	100	1

Table 12. Student 11 Results

Topic	Pretest	Posttest	Ranking
Multiplying Decimals	100	80	n/a
Percentages	50	50	n/a
Budgeting	50	50	n/a
Simple Interest	0	50	n/a
Compound Interest	0	70	n/a
Credit Cards	0	50	n/a

Typically the topics they felt were more important were the ones they made significant improvements on, but not always.

Reflection

One of the things that disappointed me was the lack of usual attendance from this group during my seminar. I addressed the poor attendance for the group during the three weeks that I presented my seminar with the Workforce Resources Coordinator that is in charge of the group. Since about half of the regular attendees did not participate and were suddenly absent for various reasons, she speculated that since some of the participants have very low level math skills they were intimidated by the seminar. She felt that they might be embarrassed by their lack of math knowledge and wouldn't want the others in the group to know. The St. Croix Valley Jobs Center does test all the participants when they sign up on basic skills/knowledge so the coordinator was aware of the low levels of these participants. She was excited to have me come and present this seminar in the beginning to help boost their mathematical understanding. If this is the case, that people with lower math skills are too embarrassed to seek free help in this form, a different approach needs to be used. If I was to teach this seminar again, I would add a basic math

seminar in addition to the financial "Money Math" that would help individuals gain more math knowledge/confidence. In the end, though, one can only help those that want the help and are open to getting it.

This whole project also had me questioning how much of Wisconsin's claimed financial literacy education is actually out there and working. The Jobs Center Coordinator said that my topic was something that was not taught there and was needed. I presented to the Workforce Resources group and later found that they had a separate website from the Jobs Center itself. This website advertised that they have financial education offered through them. This was not what I was led to believe so twice I left messages for the Workforce Connections Coordinator about this and I have received no reply. Since that time, financial education is no longer listed on the website. This makes me believe that there are definite discrepancies in what looks like is being done in financial literacy and what is actually being done.

I was also surprised that no one seems to be trying to improve people's basic math skills in order for them to understand the financial topics better. It has been stated many times that people's low math skills are a roadblock in bringing up their level of financial knowledge but there is no evidence of people addressing this. I don't see how Wisconsin can have a truly successful financial literacy program without addressing the mathematics side. Once again, however, this could scare people away and one can only help those that want to be helped. According to the Coordinator, in this study I had the more responsible participants and the results show that joining mathematics with the finance had a positive impact on overall financial literacy. I wonder what kind of impact it would have had on those that are in greater need of the mathematics refresher that chose not to attend. Unfortunately, based on my research, I don't believe that mathematical financial literacy is prevalent in Wisconsin at this time. In the future, I

hope that Wisconsin and all of America sees the important link between these two and start addressing it. As the results indicate, teaching math with finance will help in the overall understanding of financial literacy. I hope that this seminar will positively impact the participants for years to come and help them to make sound financial decisions in the future. In the end, all we can do is keep trying to educate people and hope that it reaches those in need and positively impacts lives.

If we look at Maslow's Hierarchy of Needs (physiological, safety, love/belonging, esteem, and self-actualization), we see that the individuals in this group could be at various levels based on their different backgrounds (McLeod, 2007). One thing they all have in common is that they are all unemployed. According to Maslow, this puts them at risk of not getting past the physiological stage if they can't afford food or shelter. Due to unemployment and through group discussion's we had, the participants are financially just making ends meet and therefore might not make it past Maslow's safety stage. The participants that I had the pleasure of getting acquainted with enjoyed being a part of the group, they all openly shared some experiences that benefited the group as a whole. As far as Maslow's esteem stage goes, I think it is hard to have a good self-esteem when you are unemployed and financially on the edge. This brings us to Maslow's last category of self-actualization which is something we are all striving to obtain. This group definitely has its challenges when analyzed with Maslow's Hierarchy. I see it more as a challenge and a necessity to educate this particular group in math and finance, however, it is difficult to do so if they are not ready to receive the help. I applaud Wisconsin in all that it is doing to bring financial literacy to all of its citizens, however, if the adults are not taught/retaught basic mathematics I feel it will be very difficult to impact some of those that truly need the help.

Since I have not taught in a classroom for 9 years, my Master of Science in Education (MSE) coursework helped increase my confidence in developing and presenting my own curriculum. It also enhanced my ability to reflect and analyze my project. The River Falls MSE coursework is challenging and very thought provoking and prepare me to undertake this Plan B project. I feel that this project has positively impacted my professional development. Not only has it been something to add to my resume that is sorely lacking in things from the past 9 years, but I feel it has provided me a great stepping stone to transition back into the educational system. It made me look at the Wisconsin Educational System and not just accept what it is doing, but think about ways it can be improved.

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Appendix A.

Number:_____

My name is Jeanne Salmon and I am researching the possible need for a basic financial math class that is open to the public. I ask you to participate by completing the following pretest now and another test at the end of the seminar. Please do not write your name on the test; this study is meant to be anonymous. It is completely voluntary; if you are willing to participate, please answer the questions to the best of your ability. If you choose not to participate, please return the test to the researcher. Thank you.

Please answer the following questions.

For Problem #1 show ALL work without using a calculator.

1. $\begin{array}{r} 2.522 \\ \times 1.05 \\ \hline \end{array}$

2. Calculate 22% of $460.

3. 12 is what percent of 60?

4. Uncle Sam takes 28% of your paycheck for various taxes. If you work 40 hours and earn $14.00 per hour, what is your take home pay?

5. If the retail sales tax is 5.5% in your state, what would be the total cost for the following purchases: A $68.50 pair of jeans, a $59.50 shirt, and 2 pairs of socks at $10.50 each?

Use the following formulas for questions 6 and 7.

Interest = Principal x Rate x Time Future Value = Present Value$(1 + \text{Rate})^n$ n: # Compound Periods

6. Mike Taylor borrowed $28,000 to pay for his new car. Mike must repay the loan at the end of 2 years in one payment with a 6.87% interest rate. How much interest must Mike pay? What is the total amount that he will pay?

7. What is the future value in 6 years of a $7,500 investment with an annual interest rate of 8% if it is compounded annually?

Multiple Choice. Please circle the best answer to the following questions.

8. The purpose of a budget is to increase awareness of how funds are spent and to help the individual or household develop a plan to control spending more effectively and save for the future. °
    a) True
    b) False

9. A credit card is an emergency fund. °
    a) True
    b) False

10. David just found a job with a take-home pay of $2,000 per month. He must pay $900 for rent and $150 for groceries each month. He also spends $250 per month on transportation. If he budgets $100 each month for clothing, $200 for restaurants and $250 for everything else, how long will it take him to accumulate savings of $600.*

a) 3 months

b) 4 months

c) 1 month

d) 2 months

11. Which of the following credit card users is likely to pay the GREATEST dollar amount in finance charges per year, if they all charge the same amount per year on their cards?*

a) Jessica, who pays at least the minimum amount each month and more, when she has the money

b) Vera, who generally pays off her credit card in full but, occasionally, will pay the minimum when she is short of cash

c) Megan, who always pays off her credit card bill in full shortly after she receives it

d) Erin, who only pays the minimum amount each month

° *Personal Finance Final* ((2009). Retrieved February 4, 2012, from http://www.proprofs.com/quiz-school/story.php?title=personal-finance-final

* *The Financial Literacy of Young American Adults* (2008). Retrieved February 4, 2012, from http://www.jumpstart.org/survey.html

Appendix B.

PERCENTAGE (Finding part)

Part = Base x Rate

1. Calculate 85% of 66

2. Calculate 120% of 60

3. A print shop sells a used cylinder press for 42% of the original cost. If the original cost is $8664.80, find the selling price of the used press.

4. Uncle Sam takes 28% of your paycheck for various taxes. If you work 40 hours and earn $14.00 per hour, what is your take home pay?

5. If you receive a 5% raise, what would your take home pay be from problem 4.

PERCENTAGE (Finding rate of percent)

Rate (%) = $\frac{Part}{Base}$

6. 12 is what percent of 24?

7. 19.5 is what percent of 90?

8. As an apprentice, Sue receives $450 per week. She banks $45 of that amount. What percent of her paycheck does she save?

9. Your monthly paycheck amounts to $3100. Federal withholding is $460, Social Security tax and Medicare tax is $217. What percent of your check goes to federal withholding and what percent goes to SS/Medicare?

10. Betty earns $144.56 plus tips per week as a waitress. The tips during one week were $105.15. What percent of her **total wages** were tips?

11. If a team wins 94 out of 160 games, what percent of their games did they win?

12. If your stock portfolio valued at $180,000 lost $46,000, what percent of your portfolio was lost?

PERCENTAGE (Finding base)

Base = $\frac{Part}{Percent}$

13. 15 is 10% of what number?

14. 25 is 80% of what number?

15. 312 is 120% of what number?

16. This year's earnings of a company are 140% of last year's earnings. The company earned $900,000 this year. How much did the company earn last year?

17. Bob received 78% on a math test. He got 21 questions correct. How many questions were on the test?

18. A couple made a down payment of $16500 on a home. This was 8% of the price of the home. What was the cost of the home?

PERCENTAGE CHANGE

$$\%\text{Change} = \frac{\text{amount of change}}{\text{original amount}}$$

19. If your hourly rate of pay increased from $8.40 to $9.80, what was the percent increase in pay?

20. If your salary changed from $54,000 annually to $53,750, what was the percent decrease in pay?

PERCENTAGE REVIEW

21. A piece of machinery is purchased for $12,492. In one year the machine depreciates 16.5%. By how many dollars does the machine depreciate in one year? Round your answer to the nearest whole dollar.

22. A small manufacturing plant employs 152 persons. On certain days, 18 employees are absent. What percent of the total number of employees are absent?

23. A manufacturer estimates the following percent costs to produce a product: labor, 38%; materials, 45%; overhead, 17%. The total cost of production is $180,000. Determine each of the dollar costs.

24. If your hourly rate of pay increased from $18.40 to $21.10, what was the percent increase in pay?

25. The deductions from your paycheck amount to the following: Federal withholding at 15%, Federal Medical at 9.2%, Fed SS at 6%, and WI withholding at 8.5%. If your gross income for a pay period was $964, determine the take home amount.

26. The deductions from your paycheck amount to the following: Federal withholding at 15%, Federal Medical at 9.2%, Fed SS at 6%, and WI withholding at 8.5%. If your gross income for a pay period was $964, determine the take home amount. What would the difference in your take home be if you set aside $250 pre-tax in a 401K?

27. The formula for simple interest is shown below:

$i = P \times r \times t$

$P =$ Principle

$r =$ interest rate

$t =$ time expressed in years

$i =$ interest

What would be the interest charge on a 2 year note of $8500 at 7.5%

28. What would the payoff be on a 90-day note of $3000 at 10%

Simple Interest

Simple Interest = P x R x T

Terms: Principal (P) – the amount of money borrowed or invested
Rate (R) – percent of interest paid as interest per time period
Time (T) – the number of days, months, or years (in years) that the money is borrowed or invested.

a. Isabella deposited $500 into a savings account at a local bank that earned 5% interest per year. How much interest does she earn per year?

b. When Kevin bought a new office phone, he borrowed $1,200 at a rate of 18% for 9 months. How much interest did he pay?

c. To buy a computer, Tim borrowed $3,000 at 9% interest for 4 years. How much money did he have to pay back?

d. Jodi owes $38,000 in students loans for college. The interest rate is 7.25% and the loan will be paid off over 10 years. How much will Jodi pay altogether?

e. Charlie wants to move his savings account to a new bank that pays a better interest rate of 3.5% so that he can earn $100 in interest faster than at his old bank. If he moves $800 to the new bank, how long will it take for him to earn the $100 in interest?

In each of the examples above, the interest rate was applied only to the original principal amount in computing the amount of interest. This is known as simple interest. When the interest rate is applied to the original principal and any accumulated interest, this is called compound interest. Simple and compound interest are compared in the tables below. In both cases, the principal is $100.00 is and the interest rate is 7%.

Simple Interest			
Year	Principal	Interest	Ending Balance
1	$100.00	$7.00	$107.00
2	$100.00	$7.00	$114.00
3	$100.00	$7.00	$121.00
4	$100.00	$7.00	$128.00
5	$100.00	$7.00	$135.00

Compound Interest			
Year	Principal	Interest	Ending Balance
1	$100.00	$7.00	$107.00
2	$107.00	$7.49	$114.49
3	$114.49	$8.01	$122.50
4	$122.50	$8.58	$131.08
5	$131.08	$9.18	$140.26

The formula for interest that is compounded is

$FV = PV\ (1 + r/n)^{nt}$

- Future Value (FV) represents the amount of money after a certain amount of time
- Present Value (PV) represents the principal or the amount of money you start with
- r represents the interest rate and is always represented as a decimal
- t represents the amount of time in years
- n is the number of times interest is compounded in one year, for example:

if interest is compounded annually then n = 1
if interest is compounded quarterly then n = 4
if interest is compounded monthly then n = 12

a. Mary starts out with $100. She invests the $100 in a bank account that earns 4% per year. How much will the $100 grow to in one year? In two years?

b. Suppose Nick has $1000 that he invests in an account that pays 3% interest compounded quarterly. How much money does Nick have at the end of 5 years?

c. If you start a bank account with $10,000 and your bank compounds the interest Semi-annually at an interest rate of 8%, how much money do you have at the year's end? (assume that you do not add or withdraw any money from the account)

d. The first credit card that you got charges 14.91 % interest to its customers and compounds that interest monthly. Within one day of getting your first credit card, you max out the credit limit by spending $1,200.00 . If you do not buy anything else on the card and you do not make any payments (assume no penalties), how much money would you owe the company after 6 months?

Powerful effects of Compounding Interest

- This table shows the results of making a one-time investment of $10,000 for 30 years using 12% simple interest, and 12% interest compounded annually and quarterly.

Type of Interest	Principal plus Interest Earned
Simple	$46,000.00
Compounded Annually	$299,599.22
Compounded Quarterly	$347,109.87

Budgeting

A budget is a spending plan for managing your money in a given time period. It's about seeing all your options and making smarter choices so you can reach your financial goals. Budgets change depending upon you financial situation. Without a budget you are operating in the dark when it comes to money making decisions and typically end up spending more.

Part 1 – Spending

How do you spend your money?

What do you value?

Write down 5 things you spend money on. Think about the item and decide if it is a need or want.

How would you spend $50?

Create a spending log to see if you can improve to reach financial goals faster.

Think about short term and long term financial goals and how long it might take to achieve them. (new refrigerator, vacation, birthdays, investments, etc.). How long will it take to achieve your goal?

Part 2 – Income

Cash flow – the money you have coming in as well as the money you have going out.

Income – any money you receive (job, interest, birthday, selling things, child support, etc.)

- Gross income – total amount of income from your wages before deductions.
- Net income (take-home pay) – starting point for you budget.

Part 3 – Expenses

Expenses – what you spend money on, needs and wants.

- Fixed expenses – cost the same every time (mortgage, car loan, garbage service, etc.)
- Variable expenses – fluctuate in amount (groceries, heating, gas, etc.)
- Periodic or occasional expenses – not paid every month and can be fixed or variable (auto repairs, insurance, etc.)

What type of expense is it? Cable bill, cell phone, magazine renewal, student loan?

Most important expense – P.Y.F. or "pay yourself first" used for long term goals and emergencies. Recommended 10% of income for P.Y.F..

Mortgages

Loan Amortization Schedule

Principal	**$240,000.00**	**Notes: Loan Amount**
Annual Interest	**5.25%**	**Interest Rate**
Length of loan (years)	**30**	**# of Periods**
Monthly payment	**$1,325.29**	

Payment Number	Date	Toward Interest	Toward Principal	Total Payment	Balance
					$240,000.00
1	April-12	$1,050.00	$275.29	$1,325.29	$239,724.71
2	May-12	$1,048.80	$276.49	$1,325.29	$239,448.22
3	June-12	$1,047.59	$277.70	$1,325.29	$239,170.51
4	July-12	$1,046.37	$278.92	$1,325.29	$238,891.60
5	August-12	$1,045.15	$280.14	$1,325.29	$238,611.46
6	September-12	$1,043.93	$281.36	$1,325.29	$238,330.10
7	October-12	$1,042.69	$282.59	$1,325.29	$238,047.50
8	November-12	$1,041.46	$283.83	$1,325.29	$237,763.67
		.			
		.			
		.			
350	May-41	$62.14	$1,263.15	$1,325.29	$12,939.49
351	June-41	$56.61	$1,268.68	$1,325.29	$11,670.81
352	July-41	$51.06	$1,274.23	$1,325.29	$10,396.59
353	August-41	$45.49	$1,279.80	$1,325.29	$9,116.78
354	September-41	$39.89	$1,285.40	$1,325.29	$7,831.38
355	October-41	$34.26	$1,291.03	$1,325.29	$6,540.35
356	November-41	$28.61	$1,296.67	$1,325.29	$5,243.68
357	December-41	$22.94	$1,302.35	$1,325.29	$3,941.33
358	January-42	$17.24	$1,308.05	$1,325.29	$2,633.28
359	February-42	$11.52	$1,313.77	$1,325.29	$1,319.52
360	March-42	$5.77	$1,319.52	$1,325.29	$0.00

Credit Card

This example assumes that you have accumulated $15,000 in credit card debt and you NEVER purchase another item with the credit card. Assuming you must pay 1.5% of your balance each month at 24% interest, you will pay back over $104,000 in 20 years and your debt will more than triple.

Change the cells in orange for your situation:

Credit Card Interest Rate:	**24%**
Monthly Minimum Payment:	**1.5%**
Credit Card Debt:	**$15,000**

By End Of:

	Balance Due	Annual Payment	Running Total of Payments Made
Year 1	**$16,147**	**$2,830**	**$2,830**
Year 2	**$17,121**	**$3,001**	**$5,830**
Year 3	**$18,153**	**$3,181**	**$9,012**
Year 4	**$19,248**	**$3,373**	**$12,385**
Year 5	**$20,408**	**$3,577**	**$15,962**
Year 6	**$21,639**	**$3,792**	**$19,754**
Year 7	**$22,944**	**$4,021**	**$23,775**
Year 8	**$24,328**	**$4,264**	**$28,039**
Year 9	**$25,795**	**$4,521**	**$32,560**
Year 10	**$27,350**	**$4,793**	**$37,353**
Year 11	**$29,000**	**$5,082**	**$42,436**
Year 12	**$30,748**	**$5,389**	**$47,825**
Year 13	**$32,603**	**$5,714**	**$53,538**
Year 14	**$34,569**	**$6,058**	**$59,597**
Year 15	**$36,654**	**$6,424**	**$66,021**
Year 16	**$38,864**	**$6,811**	**$72,832**
Year 17	**$41,208**	**$7,222**	**$80,054**
Year 18	**$43,693**	**$7,657**	**$87,711**
Year 19	**$46,327**	**$8,119**	**$95,831**
Year 20	**$49,121**	**$8,609**	**$104,440**

Data

Month 1		**Month 2**		**Month 3**	
Balance Due	Monthly Payment	Balance Due	Monthly Payment	Balance Due	Monthly Payment
$15,303	$230	$15,378	$231	$15,453	$232
$16,226	$243	$16,305	$245	$16,385	$246
$17,204	$258	$17,288	$259	$17,373	$261
$18,242	$274	$18,331	$275	$18,421	$276
$19,342	$290	$19,436	$292	$19,531	$293
$20,508	$308	$20,609	$309	$20,709	$311
$21,745	$326	$21,851	$328	$21,958	$329
$23,056	$346	$23,169	$348	$23,282	$349
$24,447	$367	$24,566	$368	$24,686	$370
$25,921	$389	$26,048	$391	$26,175	$393
$27,484	$412	$27,619	$414	$27,754	$416
$29,142	$437	$29,284	$439	$29,427	$441
$30,899	$463	$31,050	$466	$31,202	$468
$32,762	$491	$32,922	$494	$33,084	$496
$34,738	$521	$34,908	$524	$35,079	$526
$36,833	$552	$37,013	$555	$37,194	$558
$39,054	$586	$39,245	$589	$39,437	$592
$41,409	$621	$41,612	$624	$41,815	$627
$43,906	$659	$44,121	$662	$44,337	$665
$46,554	$698	$46,782	$702	$47,011	$705

…

Month 10		**Month 11**		**Month 12**	
Balance Due	Monthly Payment	Balance Due	Monthly Payment	Balance Due	Monthly Payment
$15,990	$240	$16,068	$241	$16,147	$242
$16,954	$254	$17,037	$256	$17,121	$257
$17,977	$270	$18,065	$271	$18,153	$272
$19,061	$286	$19,154	$287	$19,248	$289
$20,210	$303	$20,309	$305	$20,408	$306
$21,429	$321	$21,534	$323	$21,639	$325
$22,721	$341	$22,832	$342	$22,944	$344
$24,091	$361	$24,209	$363	$24,328	$365
$25,544	$383	$25,669	$385	$25,795	$387
$27,085	$406	$27,217	$408	$27,350	$410
$28,718	$431	$28,858	$433	$29,000	$435
$30,450	$457	$30,599	$459	$30,748	$461
$32,286	$484	$32,444	$487	$32,603	$489
$34,233	$513	$34,401	$516	$34,569	$519
$36,298	$544	$36,475	$547	$36,654	$550
$38,486	$577	$38,675	$580	$38,864	$583
$40,807	$612	$41,007	$615	$41,208	$618
$43,268	$649	$43,480	$652	$43,693	$655
$45,878	$688	$46,102	$692	$46,327	$695
$48,644	$730	$48,882	$733	$49,121	$737

Retirement

Compounded Annual Interest Rate:	11%

Age	Amt. Invested	$ Amount	Amt. Invested	$ Amount
25	$5,000	$5,550	$0	$0
26	$5,000	$11,711	$0	$0
27	$5,000	$18,549	$0	$0
28	$5,000	$26,139	$0	$0
29	$5,000	$34,564	$0	$0
30	$5,000	$43,916	$0	$0
31	$5,000	$54,297	$0	$0
32	$5,000	$65,820	$0	$0
33	$5,000	$78,610	$0	$0
34	$5,000	$92,807	$0	$0
35	$0	$103,016	$5,000	$5,550
36	$0	$114,348	$5,000	$11,711
37	$0	$126,926	$5,000	$18,549
38	$0	$140,888	$5,000	$26,139
39	$0	$156,385	$5,000	$34,564
40	$0	$173,588	$5,000	$43,916
41	$0	$192,683	$5,000	$54,297
42	$0	$213,878	$5,000	$65,820
43	$0	$237,404	$5,000	$78,610
44	$0	$263,519	$5,000	$92,807
45	$0	$292,506	$5,000	$108,566
46	$0	$324,681	$5,000	$126,058
47	$0	$360,396	$5,000	$145,475
48	$0	$400,040	$5,000	$167,027
49	$0	$444,044	$5,000	$190,950
50	$0	$492,889	$5,000	$217,504
51	$0	$547,107	$5,000	$246,980
52	$0	$607,288	$5,000	$279,697
53	$0	$674,090	$5,000	$316,014
54	$0	$748,240	$5,000	$356,326
55	$0	$830,547	$5,000	$401,072
56	$0	$921,907	$5,000	$450,739
57	$0	$1,023,316	$5,000	$505,871
58	$0	$1,135,881	$5,000	$567,067
59	$0	$1,260,828	$5,000	$634,994

	60	$0	$1,399,519	$5,000	$710,393
	61	$0	$1,553,466	$5,000	$794,086
	62	$0	$1,724,348	$5,000	$886,986
	63	$0	$1,914,026	$5,000	$990,104
	64	$0	$2,124,569	$5,000	$1,104,566
	65	$0	$2,358,271	$0	$1,226,068
Totals:	Amount Invested	$50,000		$150,000	Amount Invested
	Ending Balance	$2,358,271		$1,226,068	Ending Balance
	Interest Earned	**$2,308,271**		**$1,076,068**	Interest Earned

Appendix C

Simple Interest = P x R x T

Future Value = Present Value$(1 + r/n)^{nt}$

1. Matilda invested $5,000 at a rate of 7.5%. How much did she have after 6 months?

   I = 5000 * .075 * 6/12 = 187.5

   5000 + 187.50 = $5187.50

2. Aaron borrowed $200 to finance an iPad at a rate of 8.25% for 1 ½ years. How much did he repay altogether?

   I = 200 * .0825 * 1.5 = 24.75

   200 + 24.75 = $224.75

3. Sam deposited $400 into a savings account that earned 4% interest per year. How much money did he have after 2.5 years?

   I = 400 * .04 * 2.5 = 40

   400 + 40 = $440

4. Gabriella borrowed $3,600 to take a some classes at a rate of 6.25% for 4.75 years. How much interest did she pay?

   I = 3600 * .0625 * 4.75 = $1068.75

5. Matthew deposited $900 into a certificate of deposit with a rate of 1.5% for 6 months. How much money did he have in the account after 6 months?
   I = 900 * .015 * 6/12 = 6.75

   900 + 6.75 = $906.75

6. Find the future value of a $20,000 investment at 3% annual interest compounded semiannually for two years.

   FV = 20000 (1 + .03/2) ^ (2*2) = $21,227.27

7. Justin decided to invest $1000 for 2 years. The bank told him that the interest rate will be 5.25% and will be compounded semi-annually. How much will Justin end up with after 2 years?
   FV = 1000 (1 + .0525/2) ^ (2*2) = $1109.21

8. What is the future value in 6 years of a $2,500 investment with an annual interest rate of 7% if it is compounded annually?

   FV = 2500 (1 + .07/1) ^ (1*6) = $3751.83

9. Thayer Farm Trust made a farmer a loan of $1,200 at 16% for three years compounded annually. Find the compound amount and interest paid on the loan. Compare the compound interest with simple interest for the same period.

   FV = 1200 (1 + .16/1) ^ (1*3) = $1873.08
   I = 1873.08 – 1200 = $673.08

   Simple Interest = P*R*T
   1200 * .16 * 3 = $576

10. We are going to invest $100,000 in an account that earns interest at a rate of 7.5% for 4 years. Determine how much money will be in the account if,
    (a) interest is compounded quarterly
    (b) interest is compounded monthly]

    a.) FV = 100000 (1 + .075/4) ^ (4*4)
    = 100000 (1.01875) ^16
    = $134,611.43

    b.) FV = 100000 (1 + .075/12) ^ (12*4)
    = 100000 (1.00625) ^48
    = $134,859.92

Budgeting Assignment

Create your own budget using the budget worksheet provided. What do you notice about what you estimate and what the actual amount is.

Calculate what percent of your income goes toward various living expenses. There are many different guidelines out there, most recommend around:

30% Housing
19% Food
15% Transportation
10% Savings
7% Clothing
5% Utilities
5% Entertainment
5% Medical
4% Other

Keep in mind that this is just a guideline, everyones financial situation is unique and that can alter this outcome.

Monthly Budget Planner

Category

INCOME:	Estimate	Actual	Difference	% of total	Need/Want
INCOME SUBTOTAL					

EXPENSES:	Estimate	Actual	Difference	% of total	Need/Want
Fixed Expenses					
Total Fixed Expenses					
Variable Expenses					

Total Variable Expenses					

Other Expenses	Estimate	Actual	Difference	% of total	Need/Want
Total Other Expenses					

Expenses Subtotal					

Net Position (Income-Expenses)					

Appendix D

Review

1. 3.152 x1.05

   4.213 x1.05

2. What is 34% of $349.

3. 34 is what percent of 93?

4. When Ben bought a laptop, he borrowed $1,200 at a rate of 15% for 6 months. How much interest did he pay?

5. Jordan owes $38,000 in loans. The interest rate is 8.35% and the loan will be paid off over 8 years. How much will Jordan pay altogether?

6. Suppose Sandra has $1000 that she invests in an account that pays 4% interest compounded quarterly. How much money does Sandra have at the end of 6 years?

7. Eddie just found a job with a take-home pay of $2,300 per month. He must pay $800 for rent and $150 for groceries each month. He also spends $250 per month on transportation. If he budgets $100 each month for clothing, $250 for restaurants and $400 for everything else, how long will it take him to accumulate savings of $600.

Appendix E

Number:_____

My name is Jeanne Salmon and I am researching the possible need for a basic financial math class that is open to the public. I ask you to participate by completing the following posttest now. Please do not write your name on the test; this study is meant to be anonymous. It is completely voluntary; if you are willing to participate, please answer the questions to the best of your ability. If you choose not to participate, please return the test to the researcher. This project has been approved by the UW River Falls Institutional Research Board for the Protection of Human Subjects protocol number H2012-W033. Thank you.

Please answer the following questions.

For Problem #1 show ALL work without using a calculator.

1. $\begin{array}{r} 2.522 \\ \times 1.05 \\ \hline \end{array}$

2. Calculate 22% of $460.

3. 12 is what percent of 60?

4. Uncle Sam takes 28% of your paycheck for various taxes. If you work 40 hours and earn $14.00 per hour, what is your take home pay?

5. If the retail sales tax is 5.5% in your state, what would be the total cost for the following purchases: A $68.50 pair of jeans, a $59.50 shirt, and 2 pairs of socks at $10.50 each?

Use the following formulas for questions 6 and 7.

Interest = Principal x Rate x Time Future Value = Present Value$(1 + \text{Rate})^n$ n: # Compound Periods

6. Mike Taylor borrowed $28,000 to pay for his new car. Mike must repay the loan at the end of 2 years in one payment with a 6.87% interest rate. How much interest must Mike pay? What is the total amount that he will pay?

7. What is the future value in 6 years of a $7,500 investment with an annual interest rate of 8% if it is compounded annually?

Multiple Choice. Please circle the best answer to the following questions.

8. The purpose of a budget is to increase awareness of how funds are spent and to help the individual or household develop a plan to control spending more effectively and save for the future. °
    c) True
    d) False

9. A credit card is an emergency fund. °
    c) True
    d) False

10. David just found a job with a take-home pay of $2,000 per month. He must pay $900 for rent and $150 for groceries each month. He also spends $250 per month on transportation. If he budgets $100 each month for clothing, $200 for restaurants and $250 for everything else, how long will it take him to accumulate savings of $600.*

a) 3 months

b) 4 months

c) 1 month

d) 2 months

11. Which of the following credit card users is likely to pay the GREATEST dollar amount in finance charges per year, if they all charge the same amount per year on their cards?*

a) Jessica, who pays at least the minimum amount each month and more, when she has the money

b) Vera, who generally pays off her credit card in full but, occasionally, will pay the minimum when she is short of cash

c) Megan, who always pays off her credit card bill in full shortly after she receives it

d) Erin, who only pays the minimum amount each month

12. On a scale from 1 to 5, how useful did you find this seminar.

Not very useful				Very useful
1	2	3	4	5

13. Please rank the topics in order of importance to you with 1 being the most important and 7 being the least important.

Percentages _____

Budgeting _____

Simple Interest _____

Compound Interest _____

Mortgages _____

Credit Cards _____

Retirement _____

Comments:

° *Personal Finance Final* ((2009). Retrieved February 4, 2012, from http://www.proprofs.com/quiz-school/story.php?title=personal-finance-final

* *The Financial Literacy of Young American Adults* (2008). Retrieved February 4, 2012, from http://www.jumpstart.org/survey.html